

MICE RF Power Control and Distribution

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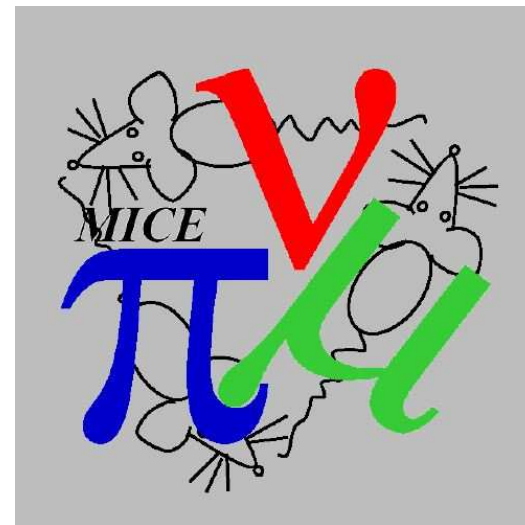
Al Moretti, Fermilab

Dan Kaplan, IIT- Chicago

Andrew Moss, STFC Daresbury Laboratory

William Spensley, Rutherford Lab

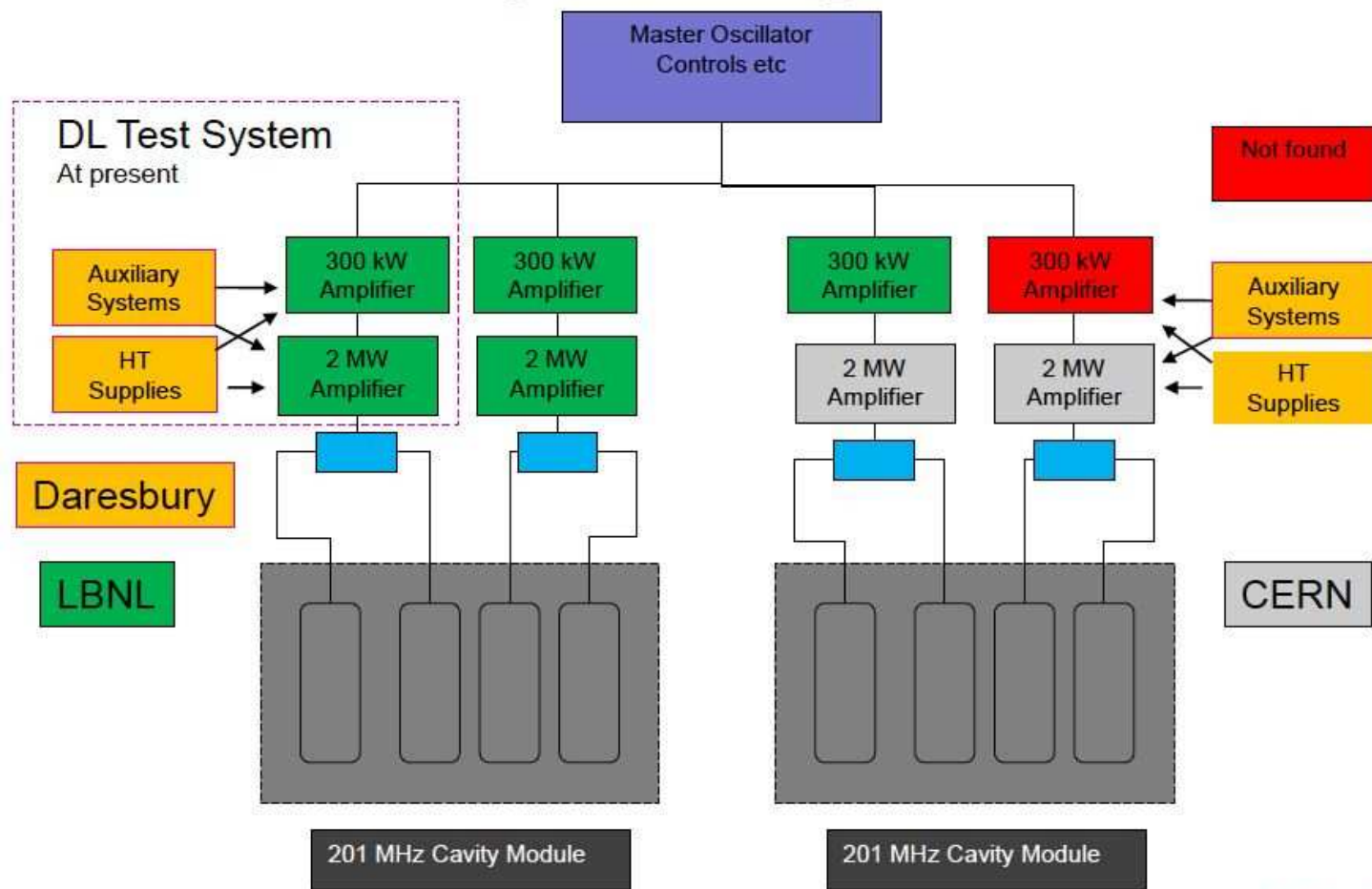
Don Summers, Lucien Cremaldi, Postdoc, University of Mississippi



28 Feb – 4 Mar 2011 Jefferson Lab, Newport News, VA
Muon Accelerator Program – Winter Meeting

MICE RF Amplifier Status

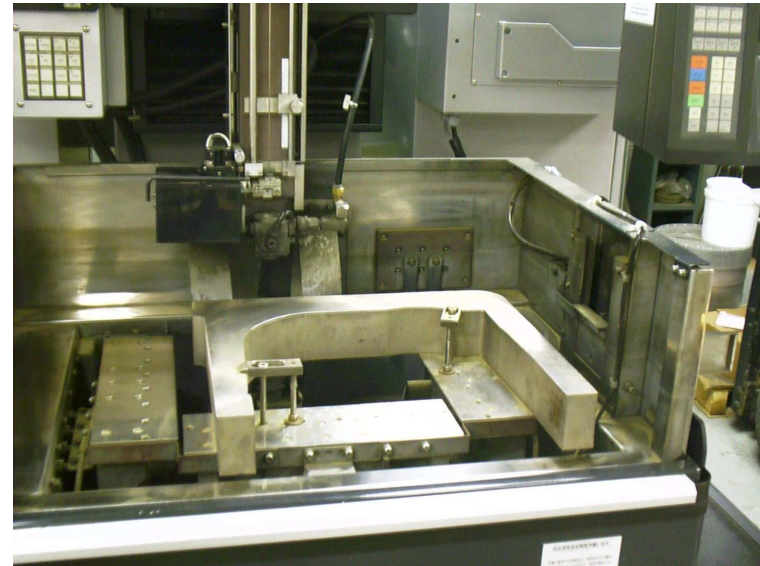
- Four 2 MW Power Amplifiers Needed
First of two LBNL/Daresbury amplifiers rebuilt in 2009.
Two CERN amplifiers refurbished and partly tested.



Andrew Moss

MICE RF Cavity Status

- Eight 201 MHz RF Cavities plus two spares are now at LBNL
Measurement of 5 RF cavities is done.
Tuners are being fabricated (water jet cut prototype below).
Ten Ceramic RF windows have arrived in the United States.
Received 9 beryllium windows, a few may be distorted.



Connecting Amplifiers to Cavities Including Control

Item	Cost (k\$)
Burle 4616 Amplifier Circuit	80
Burle 4616 Tetrode Amplifier Tubes (2)	109
Low-power RF Amplifiers (Power Supply Units)	30
33 kV Power Supplies (2)	302
18 kV Power Supplies (2)	168
Auxiliary Racks (2)	84
Control System (2)	86
Power Feeds (coax, hybrids, loads, coupler, phase shifters; see Page 4)	467
Total Equipment	1,327

Possible Vendors (most of the above costs come from vendor quotes):

Mega Industries, LLC, 38 Sanford Dr., Gorham, Maine 04038

Altronics Research Inc., Box 249, Yellville, Arkansas 72687

Micro Communications, Box 4365, Manchester, New Hampshire 03108

Burle Industries, 1000 New Holland Ave., Lancaster, Pennsylvania 17601

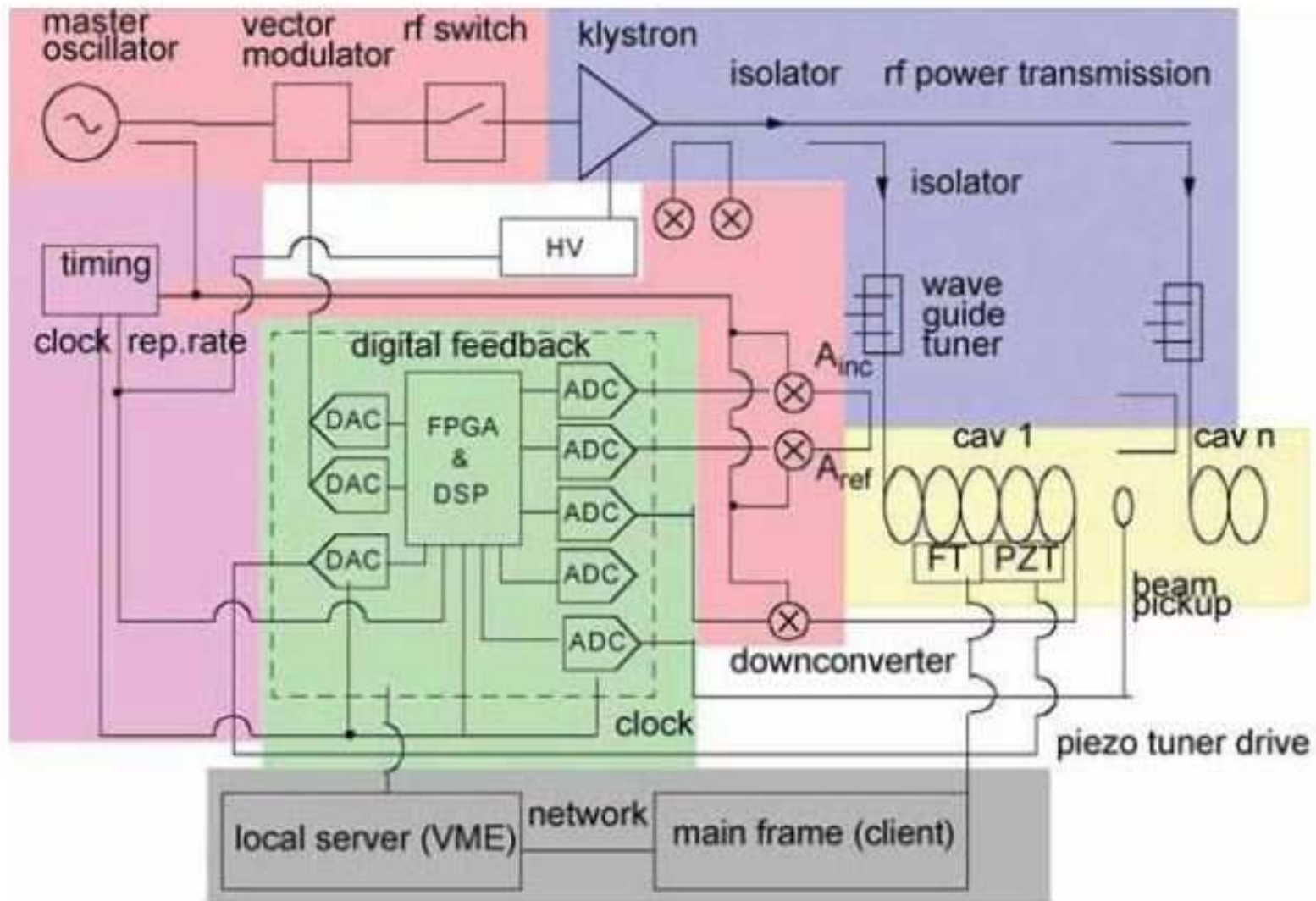
Myat, Inc., 380 Chestnut St., Norwood, New Jersey 07648

Dielectric Communications, 22 Tower Rd., Raymond, Maine 04071

Power Feeds for 8 MICE RF Cavities

Item	Number Needed	Unit Cost	Total Cost
3-1/8" Switch at Load	4	5,700	22,800
9" Directional Coupler	4	3,575	14,300
9" Phase Shifter	4	23,100	92,400
9" Matched Tee	4	3,120	12,480
9" Copper Coax Line Straight	4 sets (3', 4', 6')	5,870	23,480
9" Elbows	10	2,550	25,500
9" to 6" Transition	8	2,100	16,800
6" Hybrid & Load	8	16,850	134,800
6" Gas Barrier	8	1,335	10,680
6" Directional Coupler	8	1,570	12,560
6" Elbow	8	1,060	8,480
6" Copper Coax Line Straight	8 sets of (3', 5')	1,595	12,760
6" to 4" Transition	16	670	10,720
4" Elbows	32	575	18,400
4" Directional Coupler	16	1,050	16,800
4" Gas Barrier	16	575	9,200
4" Copper Coax Line Straight	24 sets (3', 4', 6')	1,550	24,800
		TOTAL	\$466,960

Typical RF Control System with Digital Feedback

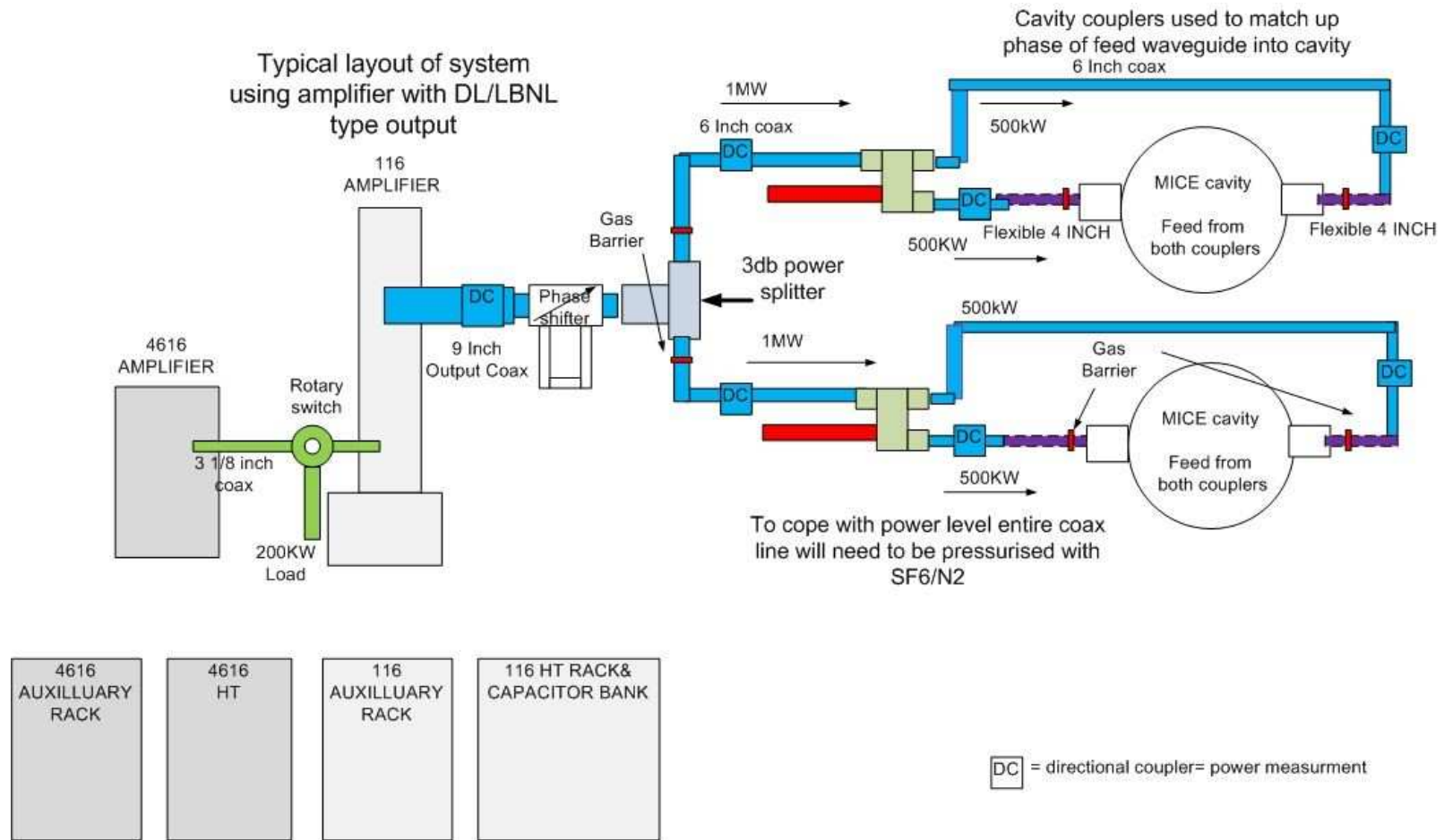


Prototype MICE Low Level RF Digital Control Board



**A. Moss, J. Orrett, P. Corlett, and J. Rogers, MICE RF System,
accelconf.web.cern.ch/AccelConf/e08/papers/mopp099.pdf**

Components for one complete MICE amplifier system



System Requirements

- **Smart Low-level RF feedback and feed-forward electronics**
Phase control to half a degree.
Amplitude control to 0.5%.
Frequency control to a kilohertz.
Cavities must be phase/amplitude/frequency locked together.
- **Equipment purchases will begin shortly.**
Purchases over \$25,000 require bids.